**"MoodTune: Visualizing and Predicting Moods Based on Music Listening Behavior"**

**Group members: Rob Ranieri, Peter Lin, Gwen Seymour**

**1. Project Overview**

The proposed project aims to develop an interactive dashboard that visualizes users’ music listening behavior and predicts their moods using machine learning models. By analyzing listening patterns, audio features, and contextual data, the dashboard provides insights into how music correlates with and potentially influences mood over time.

**2. Objectives**

* **Visualize** music listening behavior (frequency, time of day, genre, tempo, etc.)
* **Integrate ML models** to predict user mood from audio features and contextual metadata
* **Provide recommendations** or mood analysis feedback in an engaging dashboard format
* **Analyze trends** between music types and self-reported emotional states

**3. Data Sources**

* **Spotify API**: Track metadata (e.g., tempo, key, danceability, valence, energy, etc.), listening history
* **DEAM (Database for Emotional Analysis of Music):** To track emotion recognition in music research
* **Self-reported mood data**: User-tagged emotions (via survey, form, or mood logging)

**4. Key Features**

* 📈 **Dashboard Components**:
  + Listening frequency over time
  + Genre and mood heatmaps
  + Energy vs Valence trends
  + Time-of-day listening behavior
  + Personalized insights
* 🤖 **Machine Learning Integration**:
  + **Classification model** (Random Forest / Logistic Regression) to predict mood from music features
  + **Clustering** (K-Means) to group similar mood profiles
  + **Recommendation system** to suggest tracks for mood regulation
* 🧠 **Emotion Modeling**:
  + Map audio features to emotion labels (happy, sad, relaxed, angry, etc.)
  + Use valence-arousal mapping to interpret moods

**5. Tools & Technologies**

* **Python**: Data processing, modeling (Pandas, NumPy, Scikit-learn)
* **Spotify API / Spotipy**: Data ingestion
* **PyQt:** Desktop GUI development and interactive dashboard
* **VisualStudio:** Interactive prototype
* **PostgreSQL / MongoDB / Spark**: Data storage
* **Seaborn / Plotly**: Advanced visualizations